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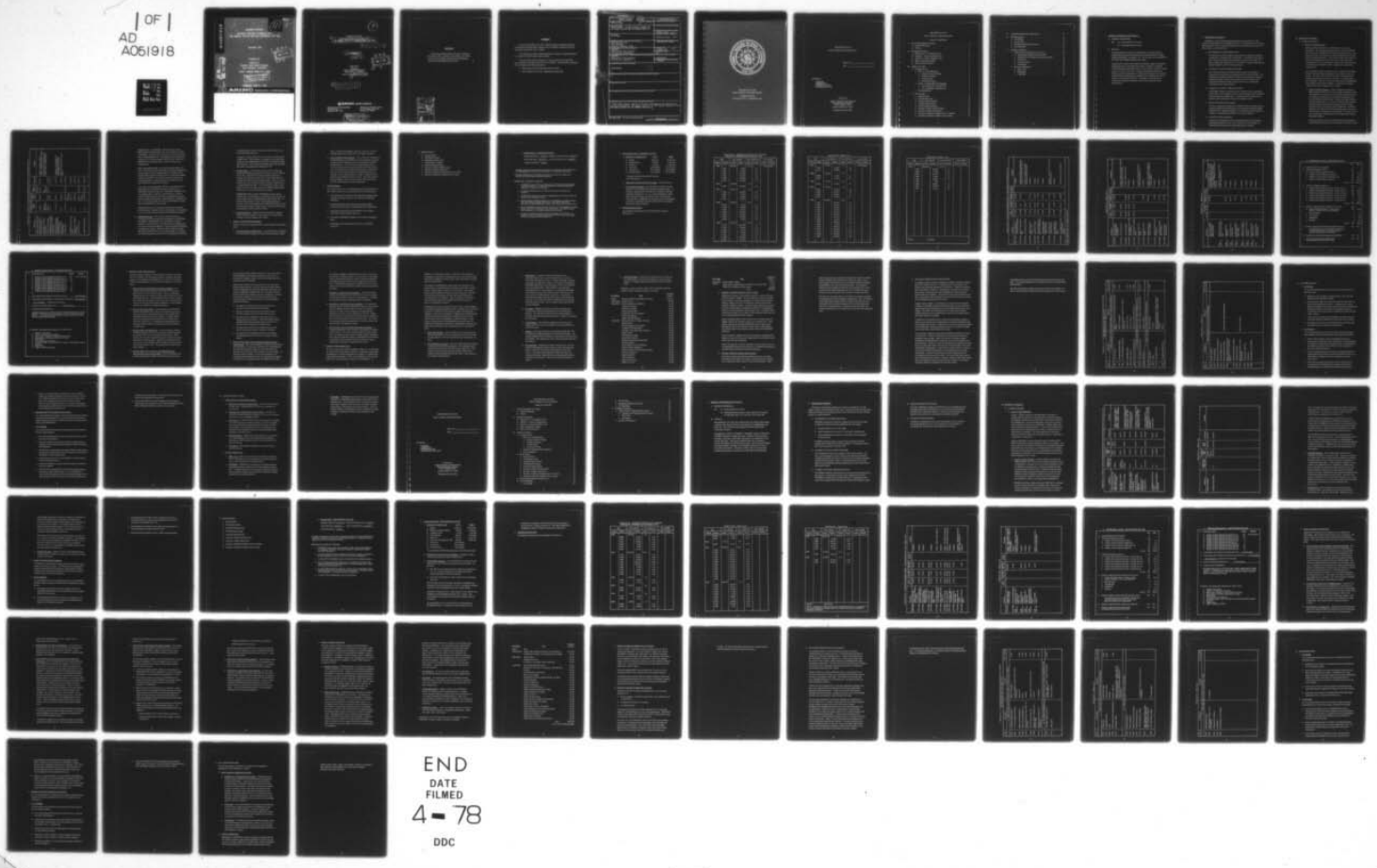

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SUMMARY REPORT:

ADVANCE OVERHAUL PLANNING FOR USS ABNAKI (ATF-96) AND USS CHOWANOC (ATF-100)

December 1974

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Prepared for

PERA(CSS)
Hunters Point Naval Shipyard
San Francisco, California

Under Contract N66314-74-C-2052

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ABSTRACT

Postoverhaul analysis reports of two fleet ocean tugs of the Service Force, Pacific, are presented. The reports relate to the 1974 regular overhauls of the USS ABNAKI (ATF-96) and USS CHOWANOC (ATF-100).

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SUMMARY

Under Contract N66314-74-C-2052, ARINC Research Corporation performed selected tasks for PERA(CSS) in support of the 1974 regular overhauls of two fleet ocean tugs of the Service Force, Pacific.

The Corporation's support included assistance in advance overhaul planning and the preparation of postoverhaul analysis reports.

The postoverhaul reports, prepared to a format prescribed by PERA(CSS), were individually submitted to that activity as completed. These reports are compiled in this document in the following sequence:

a. USS ABNAKI (ATF-96), Publication W4-1618-TN01

b. USS CHOWANOC (ATF-100), Publication W4-1618-TN02

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Postoverhaul analysis reports of two fleet ocean tugs of the Service Force, Pacific, are presented. The reports relate to the 1974 regular overhauls of the USS ABNAKI (ATF-96) and USS CHOWANOC (ATF-100).

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USS ABNAKI (ATF-96)

POST OVERHAUL ANALYSIS REPORT

OVERHAUL DATES

19 February 1974 – 12 September 1974

USS ABNAKI (ATF-96)

POST OVERHAUL ANALYSIS REPORT

Approved: _____

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COMSERVPAC
COMSERVGRU ONE
USS ABNAKI (ATF-96)

Prepared by

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USS ABNAKI (ATF-96)

POST OVERHAUL ANALYSIS REPORT

TABLE OF CONTENTS

I. GENERAL INFORMATION AND PREFACE

A. GENERAL INFORMATION

Ref: (a) Contract N66314-74-C-2052.

(b) PERA(CSS) Milestone Charts.

B. PREFACE

The USS ABNAKI (ATF-96) was overhauled from 19 February through 12 September 1974 under the direction of the Resident Supervisor of Shipbuilding (RESUPSHIP), Long Beach, CA. The overhaul was accomplished at the Harbor Boat Building Company, Long Beach.

In planning the overhaul of the ABNAKI, PERA(CSS), acting as maintenance management agent for NAVSHIPS and the type commander, established advance planning milestones (References a and b) which commenced 6 months prior to the overhaul start date. The goal of the planning effort was to identify in advance any potential and existing problem areas, and to provide the detailed preoverhaul guidance, planning, and coordination necessary to achieve a successful yard overhaul. The purpose of this report is to evaluate the management judgments and decisions associated with the planning effort.

II. MANAGEMENT SUMMARY

References a and b list the management milestones in planning the FY 1974 regular overhaul (ROH) of the USS ABNAKI (ATF-96). Deviations from the milestones that affected the overhaul, and unanticipated factors that contributed to the final overhaul outcome, are discussed below.

A. AUTHORIZED VS ACCOMPLISHED WORK

The repair portion of the ABNAKI work package was essentially completed as authorized. Exceptions were the following: 1) installation of the deep fat fryer, fan motors for the galley refrigerators and cold food counter, and mirror lights in the sanitary spaces; 2) correction of problems with steering, teletype equipment, and the ac motor generator.

B. PLANNED VS. ACTUAL COMPLETION TIME

The overhaul start date was delayed 19 days to allow for completion of design action and preparation of job specifications for late work items. The completion of overhaul was delayed 74 days due to generally slow progress during the overhaul, late delivery of certain items of contractor- and government-furnished material, change orders issued on switchboard rewiring jobs, and design problems.

C. PLANNED VS. ACTUAL COMPLETION COSTS

The SUPSHIP departure report had not been released as of the preparation of this report, so a comparison of actual versus estimated costs for ABNAKI overhaul cannot be presented herein. A supplement to this report will be prepared and forwarded after receipt of the departure report.

D. MAJOR CONFIGURATION CHANGES

The major configuration changes to the ABNAKI involved replacing the main propulsion engines and accomplishing several pollution-abatement shipalts. Habitability was significantly upgraded. A modernized towing machine was installed. Communication capabilities were greatly enhanced.

E. FOLLOW-ON WORK REQUIRED

In addition to completing the items noted in paragraph A above and in the Long-Range Maintenance Plan, the development of several shipalts for modernizing the electrical power generating plant is required.

III. DETAILS OF OVERHAUL

A. PLANNING PROCESS

1. Ideal Vs. Actual Milestones

Advanced overhaul planning for the USS ABNAKI commenced in August 1973. The overhaul planning procedures used for the ABNAKI are defined in the COMSERVPAC "Overhaul Planning Task Chart, Task Index, and Tasks", the PERA(CSS) "Combatant Support Ship Overhaul Advance Planning Milestones". These advance planning milestones provide for accomplishment of 53 tasks, of which 36 are PERA action responsibility. The ideal target dates for these tasks range from start of overhaul minus 20 months (A-20) to completion of overhaul plus 2 months (C+2).

With the ABNAKI overhaul scheduled to start 1 February 1974, ARINC Research commenced advance planning for the overhaul at about A-6 months. *This made it necessary to compress* the time frame of the planning milestones and to combine some tasks. All required tasks were completed. Table III.A-1 shows the dates for the accomplishment of the principal milestones for ABNAKI. The following paragraphs summarize the advance planning for the overhaul.

a. Advance Overhaul Planning. Overhaul planning was initiated by ARINC Research with a survey of the available maintenance history of the ABNAKI as contained in the Current Ships Maintenance Project (CSMP) and the Maintenance and Material Management (3M) Program Material History Report. Programmed ship alterations and TYCOM alterations were reviewed, along with other pertinent maintenance history documents such as last overhaul records, departure reports, and casualty reports (CASREPs). An INSURV inspection was conducted in November and the report was used as reference in the screening of the work package. The only new work item resulting from this inspection was the replacement of power distribution cabling.

During the same time frame, an ARINC Research representative briefed ABNAKI personnel on the Corporation's role in the overhaul

TABLE III.A-1. IDEAL VS. ACTUAL MILESTONES FOR ROH OF USS ABNAKI (ATF-96)

Milestone	COMSERVPAC Target Date	Contract Target Date	Actual Start	Completion	Remarks
PERA Contract Start Date			7/31/73		
Obtain Historical Data; Review Alt Package	Immed.	Immed.	8/6/73	9/1/73	CSMP, 3M material history reports, shipalts, AERs, CASREPs.
Brief Ship on Overhaul Preparation	Prior to deployment		See Remarks		Ship briefed by PERA(CSS) personnel prior to contract award.
Receive Work Package	Immed.	9/1/73	9/1/73	10/15/73	
NAVSHIPS Issue Tentative K-Alts; Task First-Time Alt Drawings	A-10	4/1/73		3/15/73	
Screen Work Package; Determine Known Work; Conduct Shipcheck	A-9 to A-6	9/1/73		11/15/73	Complete work package less POT/I items delivered to RESUPSHIP on 11/15/73.
Determine POT/I Requirements	A-6	8/27/73		8/27/73	ROH start date 1/18/74 at that time.
Conduct POT/I	A-6 to A-3	11/5/73 to 11/16/73	11/15/73	11/16/73	
NAVSHIPS Issue 180-Day Letter	A-6	8/1/73		10/19/73	
Conduct Work Definition Conference	A-2	12/18/73		12/18/73	
Perform Overhaul		2/1/74 to 6/30/74	2/19/74	9/12/74	
Complete Final Report	C+2	11/12/74	9/12/74	11/30/74	

planning process. Subsequently, while the ship was in port, ARINC Research assisted ship's force in developing the overhaul work package. The ship's work requests were received from the ship in early September 1973. The package was then shipchecked, screened, and – with the exception of POT/I items – delivered to RESUPSHIP on 15 November 1973, 15 days in advance of the requested date.

Early in the planning effort, it was determined that Shipalt ATF 188K, "Install MF, HF and MF/HF SSB Communication Equipment", was not programmed for accomplishment. The portion of this alteration which includes replacing the TBL-13 radio transmitting set with the AN/WRT-1 was considered necessary because the existing equipment was obsolete and beyond economical repair. This alteration was authorized 19 October.

Preoverhaul Test and Inspections (POT/I) were conducted by the Development and Training Center (DATC), San Diego, and RESUPSHIP during November 1973. RESUPSHIP conducted POT/I on navigation lights, electronics, main propulsion and ship's service electrical systems, and degaussing equipment; and manufacturer technical representatives inspected the tow machinery and gyro. The resulting reports were used by RESUPSHIP in developing work specifications for the overhaul.

RESUPSHIP planners and estimators conducted their shipcheck 28-30 November. Estimates, but not specifications, were prepared in time for an 18 December tradeoff (work definition) conference.

b. Tradeoff Conference. The overhaul tradeoff conference on 18 December 1973 was attended by representatives of RESUPSHIP, USS ABNAKI, COMSERVGRU ONE, PERA(CSS), and ARINC Research. At the conference, overhaul work with a planning estimate of $1,637,000 was authorized. This amount included $120,000 to rebuild a tow machine. When the regular overhaul of another ship (USS APACHE ATF-67, now decommissioned) was cancelled, the rebuilt tow machine for that vessel was designated for ABNAKI.

The $120,000 thus released resulted in additional repair work in that amount being authorized.

In January, a further $110,000 for the overhaul was authorized by COMSERVPAC. The final planning estimate for the overhaul after all new work was authorized was $1,746,866, not including design and GFM costs. The bid date was extended to allow the late authorized work to be included in the invitation for bid.

c. Overhaul Phase. For the shipyard portion of the overhaul, the Harbor Boat Building Company of Long Beach was the low bidder at $1,618,565. At the time the ABNAKI overhaul contract was awarded, the USS COCOPA (ATF-101) was nearing the end of its overhaul at the Harbor Boat Building Company. However, work on COCOPA was over 20% behind schedule, and that overhaul was not completed until 30 May 1974. As a result of the pressure to complete the COCOPA overhaul, progress on ABNAKI slipped approximately 2% per week from the start of its overhaul.

COMSERVGRU ONE requested PERA(CSS) to provide a representative for a 3-month period in Long Beach to assist the ship and provide liaison between RESUPSHIP and COMSERVGRU ONE. He monitored the progress of work, helped expedite solutions to problems, made recommendations to COMSERVGRU ONE as to what action to take on proposed change orders, monitored GFM delivery, and attended the weekly progress meetings.

d. Postoverhaul Phase. ARINC Research Corporation's responsibilities following completion of the overhaul were to analyze the overhaul records and prepare a final report.

2. Impact of Planning Milestone Slippages

Actions or occurrences impacting on the overhaul schedule are discussed below.

a. Late Authorization of Repair Work. Late authorization of significant new work and late completion of design action delayed the overhaul

start. As noted in paragraph 1.b, the new work was a result of additional funds made available after the tradeoff conference.

b. Late Availability of Specifications. The fact that only estimates and not specifications were available for the work definition conference severely hindered ARINC Research in conducting the work-item tradeoff analysis. A review of the estimates indicated that in several cases the intent of the work request had not been carried out. Conversations were conducted with individual estimators in lieu of a review of the specifications. Specifications were not available to the overhaul manager, the ship, or ARINC Research until after the invitation for bid was issued. This made review of the specifications, and any desired changes of the specification articles, difficult and in some cases impossible.

3. Recommendations

As a result of the review of the planning process for the ABNAKI overhaul, ARINC Research recommends that efforts be directed toward:

a. Ensuring that the development of ship alteration drawings and the ordering of material progresses according to the PERA(CSS) milestones.

b. Reviewing applicable Fleet Modernization Program (FMP) documents to ensure that all required shipalts are programmed.

c. Developing both estimates and specifications early enough to support the overhaul tradeoff conference.

d. Increasing PERA(CSS) participation in the overhaul management phase.

e. Establishing a firm budget figure before the work definition conference.

B. WORK PACKAGE

1. Summary Sheet
2. Cost Summary Sheet
3. Alteration Summary Sheet
4. TYCOM Repair Package
5. PERA Screening Summary
6. Narrative of Major Alteration Items
7. Narrative of Major Repair Items
8. Narrative of Material Condition Prior to Overhaul
9. Narrative of Material Condition After Overhaul

1. Summary Sheet – USS ABNAKI (ATF-96)

Scheduled Start Date: 1 Feb 73 Scheduled Completion Date: 30 Jun 74

Actual Start Date:* 29 Feb 74 Actual Completion Date: 12 Sept 74

Overhaul Extended:** 74 days

*Overhaul start date delayed to allow completion of design action and preparation of job specifications for new work authorized after work definition conference.

**Overhaul extended due to relatively slow progress during the overhaul, late delivery of CFM and GFM, and design problems.

SIGNIFICANT CAPABILITY CHANGES:

a. The ABNAKI received four new Caterpillar D-399 main propulsion engines during the overhaul. In a companion alteration, waste heat evaporators replaced the existing solo-shell type.

b. A rebuilt and modernized A.A. *Johnson Series 222 tow machine* was installed.

c. An AFFF/PKP (aqueous film foam firefighting/purple-K powder) system was installed in the machinery spaces.

d. Several pollution abatement shipalts were accomplished, including a partial CHT (collecting and holding tank) system, installation of tank level indicators, a bilge flooding alarm circuit, and a bilge water discharge riser.

e. Several habitability shipalts (both title D and K) were accomplished, including galley, food service, and mess-deck modernization. All sanitary spaces were refurbished. New laundry equipment was installed.

f. A secure voice system and the non-secure teletypes were installed. An AN/SPS-53 radar was installed and the obsolete TBL-13 radio communication set was replaced by the AN/WRT-1B.

2. Cost Summary Sheet – USS ABNAKI (ATF-96)

a. Summary of Overhaul Costs

	K-Alt	Repair
1) Budget	$472,350	$1,745,866
2) Estimated Cost	399,080	1,431,183*
3) Bid Price	352,920	1,264,645**
4) Total Cost	Not Available	Not Available
5) Growth Cost	Not Available	Not Available
6) Percent Growth	Not Available	Not Available

*Includes $83,397 design and GFM estimate.

**Prorated bid cost.

b. Estimated Overhaul Costs by EIC Category. See Table III. B-1.

c. Cost Avoidance Summary. For the ABNAKI overhaul, 445 work requests were received from the ship and screened by PERA. Of this total, approximately 23 percent were screened as deferred, duplicated, disapproved, etc., as a result of shipchecks, discussions with ship personnel, and analysis of the work requested. This represents a substantial cost avoidance to the type commander as well as a considerably lightened workload for the overhauling activity and overhaul manager.

3. Alteration Summary Sheet

The alteration summary sheet for the USS ABNAKI is shown in Table III. B-2.

TABLE III. B-1. ESTIMATED COSTS BY EIC CATEGORY FOR ROH OF USS ABNAKI (ATF-96) (Sheet 1 of 3)

EIC		Est. Cost ($)		Pct. Total Cost		Pct. Growth	
System	Subsys.	System	Subsys.	System	Subsys.	System	Subsys.
1000		191,235		10.4		Not Available	
	1100		7,585		0.4		
	1600		3,676		0.2		
	1700		24,515		1.3		
	1A00		13,438		0.7		
	1B00		65,069		3.6		
	1C00		76,952		4.2		
3000		60,686		3.3			
	3100		60,686		3.3		
4000		112,142		6.1			
	4100		34,934		1.9		
	4300		5,761		0.3		
	4600		16,890		0.9		
	4700		54,557		3.0		
A000		217,266		11.9			
	A100		2,715		0.2		
	A500		12,466		0.7		
	A700		6,271		0.3		
	A900		136,156		7.4		
	A000		40,298		2.2		
	AB00		11,032		0.6		
	AC00		8,328		0.5		
C000		383,675		21.0			
	C100		151,861		8.3		
	C400		46,296		2.5		
	C600		7,474		0.4		
	C700		7,664		0.4		
	C800		7,664		0.4		
	CB00		121,544		6.7		
	CE00		41,172		2.3		

TABLE III. B-1. (Sheet 2 of 3)

EIC		Est. Cost ($)		Pct. Total Cost		Pct. Growth	
System	Subsys.	System	Subsys.	System	Subsys.	System	Subsys.
L000		33,000		1.8		Not Available	
	LB00		3,100		0.2		
	LJ00		29,900		1.6		
M000		12,418		0.7			
	M500		8,826		0.5		
	M600		3,592		0.2		
P000		11,483		0.6			
	P100		11,483		0.6		
Q000		75,406		4.1			
	Q000		11,152		0.6		
	QE00		15,747		0.9		
	QF00		22,942		1.2		
	Q300		25,565		1.4		
T000		516,098		28.2			
	T100		24,114		1.3		
	T300		27,318		1.5		
	T400		18,038		0.9		
	T500		18,373		1.0		
	T700		70,874		3.9		
	T800		43,857		2.4		
	T900		27,415		1.5		
	TA00		6,075		0.3		
	TB00		19,691		1.1		
	TD00		6,837		0.4		
	TF00		30,824		1.7		
	TK00		60,422		3.3		
	TL00		52,951		2.9		
	TM00		93,223		5.1		
	TS00		16,086		0.9		

TABLE III. B-1 (Sheet 3 of 3)

EIC		Est. Cost ($)		Pct. Total Cost		Pct. Growth	
System	Subsys.	System	Subsys.	System	Subsys.	System	Subsys.
U000		216,854		11.9			
	UA00		60,000		3.3		
	UB00		5,000		0.3		
	UF00		70,188		3.8		
	UH00		5,000		0.3		
	UJ00		11,960		0.7		
	U500		928		-		
	U600		23,600		1.3		
	U700		33,034		1.8		
	U800		7,144		0.4		
TOTAL:			1,830,263				

TABLE III. B-2. ALTERATION SUMMARY SHEET – USS ABNAKI(ATF-96) (Sheet 1 of 3)

Alteration		FMP Est ($)	NAVSHIP Est ($)	SUPSHIP Est ($)	Actual Cost ($)	Remarks
ATF-185K	Power Supply for Electronic Equipment	72,485	69,365	46,350		Complete
ATF-188K	MF, HF and MF/HF SSB	38,150*	N/A	15,747		Partial; AN/WRT-1 installed IAW CINCPACFLT 190858Z, Oct. 73
ATF-203K	Non-Secure Teletype	14,606	11,962			Partial to complete; estimate included in S/A ATF-205K
ATF-205K	Install UHF/VHF Secure Voice	15,805	12,945	48,507		Complete
ATF-206K	AN/SPS-53 Radar	18,857	15,444	11,483		Complete
ATF-212K	General Weight and Moment Compensation	11,554	9,463	8,328		Complete
ATF-216K	Install Mach Space AFFF/PKP Fire Fighting System	87,200	71,417	27,415		Complete
ATF-226K	P/A Sewage CHT (Partial System)	150,093*	105,000	44,352		Complete. S/A ATF 263K will complete installation.
ATF-227K	P/A Install Bilge Water Discharge Riser	10,573	8,659	6,075		Complete
ATF-229K	P/A Install Fuel Tank Level Indicatory System	78,698	64,453	59,700		Partial; minor mods required

*FMP estimate based on complete installation.

TABLE III. B-2. (Sheet 2 of 3)

Alteration		FMP Est ($)	NAVSHIP Est ($)	SUPSHIP Est ($)	Actual Cost ($)	Remarks
ATF-232K	P/A Install Bilge Flooding Alarm Circuit FD	2,071	1,696	8,826		Complete
ATF-236K	H/I Food Service	21,037	17,230			Partial; GFM not received, estimate included in S/A ATF-237K.
ATF-237K	H/I Galley Mods	47,306	38,743	65,069		Partial; GFM not received.
ATF-243K	H/I Sanitary Space Vent and Sheathing	54,282	44,457	63,639		Complete
ATF-244K	H/I Relocate Hot Water Heater	14,061	11,516	9,336		Complete
ATF-164D	Modify Boiler Air Casing					Complete; estimate included in boiler replacement job.
ATF-208D	Install Dual Task Lights			15,300		Complete
ATF-213D	Replace Main and Auxiliary Engines			151,861		Partial; main engines replaced, auxiliary engines to be subject of revised shipalt.
ATF-217D	Install AC Shore Power Connection			1,860		Complete
ATF-246D	H/I Replace Sanitary Space Fixtures			18,178		Complete
ATF-256D	H/I Crew Mess Rearrangement			20,575		Complete

TABLE III. B-2. (Sheet 3 of 3)

	Alteration	Est ($)	NAVSHIP Est ($)	SUPSHIP Est ($)	Actual Cost ($)	Remarks
	H/I Crews Berthing Improvement (No ShipAlt Number)			73,267		PERA 030008Z, Nov. 73, refers. Partial; Shipalt brief not issued. Alt accomplished IAW guidance drawings. Additional work may be required.
AER ATF-75	Install Cut Out Valve in Boiler Fuel Supply Line					Complete. Estimate included in boiler replacement job.
AER ATF-84	Improve Salvage Capability			40,298		Complete
AER ATF-85	Install Waste Heat Evaporators			60,422		Complete
AER ATF-89	Install Remote Start Stop Stations for Fire Pumps			2,140		Complete
AER ATF-97	Install 7.5 Ton AC Unit in CPO Quarters			18,038		Complete
AER ATF-97	Fresh Water Pumps, Relocate			4,914		Complete
AER ATF-100	Modify 30 KW M/G Control Circuit			1,112		Complete
AER	Install Mast Saf-T-Climb System			1,560		Complete

4. TYCOM Repair Package - USS ABNAKI (ATF-96)

		No.	Pct.
1.	Total Automated Work Requests	0	
2.	Total Work Requests Screened	445	
	a. Number of Work Requests Deferred	22	4.9
	b. Number of Work Requests Disapproved	32	7.2
	c. Number of Work Requests Duplicated, etc.	50	11.3
	d. Number of Work Requests Approved	341	76.6
	TOTAL	445	100.0
3.	Total Work Requests Approved	341	
	a. Number Work Requests Screened: Priority One (1)	18	5.3
	b. Number Work Requests Screened: Priority Two (2)	129	37.8
	c. Number Work Requests Screened: Priority Three (3)	134	39.3
	d. Number Work Requests Screened: Priority Four (4)	58	17.0
	e. Number Work Requests Screened: Priority Five (5)	2	0.6
	f. Number Work Requests Screened: Priority Six (6)	0	0.0
	TOTAL	341	100.0
4.	Number of Approved Work Requests by Type Work	341	
	a. Repair (including Remove, Replace, Manufacture, Drydock, POT/I, and Calibrate)	314	92.1
	b. Ship Alteration	5	1.5
	c. TYCOM AER	8	2.3
	d. Habitability	9	2.6
	e. Routines	5	1.5
	TOTAL	341	100.0
5.	Number of Approved Work Requests Insurance Items: As insurance items were identified, the ship was advised to include them in the work package. Separate identity was not maintained.	NA	NA
6.	Number of Approved Work Requests Accomplished	NA	NA
7.	Number of Approved Work Requests Not Accomplished and Not Entered in CSMP	NA	NA

5. PERA Screening Summary - USS ABNAKI (ATF-96)

1. Screening Action	PERA	TYCOM
a. Number of Work Requests Screened One (1)	157	See Comments
b. Number of Work Requests Screened Two (2)	72	
c. Number of Work Requests Screened Three (3)	112	
d. Number of Work Requests Screened Four (4)	0	
e. Number of Work Requests Screened Five (5)	0	
f. Number of Work Requests Screened Six (6)	0	
g. Number of Work Requests Screened Seven (7)	0	
h. Number of Work Requests Screened Eight (8)	22	
i. Number of Work Requests Screened Nine (9)	32	
j. Number of Work Requests Screened Zero (0)	50	

(*)

2. Total Number Work Requests TYCOM Concurred: See Comments

3. Total Number Work Requests TYCOM Screened Otherwise: See Comments

4. See Comments % Agreement in Screening

5. Analysis of Screening Differences: See Comments

6. *Comments/Recommendations:*

Screening actions were reviewed with the overhaul manager prior to being finalized. No distinction was made between PERA and TYCOM screening actions. It can be generally stated that the overhaul manager concurred with the recommended screening.

(*) LEGEND: Screening Action (Appendix 17, OPNAV 43P2)

1. Shipyard accomplish
2. Tender or repair ship accomplish
3. Ship's force — (tender or repair ship/yard) assist
4. Accomplish as alteration equivalent to a repair
5. Ship to shop
6. Accomplish with modification
7. Yard open inspect — advise TYCOM — proceed with minimum repairs
8. Deferred
9. Disapproved
0. Other — specify in remarks

6. Narrative of Major Alteration Items

Only one first-time alteration was accomplished on ABNAKI: to modify the crew's berthing. This alteration presented no particular difficulties. However, major design and GFM problems were encountered during the overhaul in accomplishing several of the other alterations, as discussed below.

a. S/A ATF-185K, Power Supply for Electronic Equipment. The alteration brief stated that existing single-phase motor generator (MG) sets will be removed from the ship. However, installation drawings issued to the contractor showed retention of the two 10-kW single-phase MG sets. These drawings had to be revised to reflect the removal of the single-phase sets, and to show an alternate power source to the interior communication switchboard. Three calendar months were expended in resolving this problem.

b. S/A ATF-216K, AFFF/PKP. The installation of the AFFF/PKP system on the ABNAKI did not satisfy the alteration requirements because the system's operating stations were not identified on the installation drawings in the proper locations. Drawings with the same errors had previously been issued for the overhaul of the USS COCOPA (ATF-101). An appropriate design solution was not reached for ABNAKI until the overhaul was nearing its scheduled completion date.

c. S/A ATF-226K, P/A Sewage CHT. For this alteration, numerous installation-drawing errors were encountered, which necessitated the issuance of several job-specification change orders. Additionally, late delivery of copper-nickel pipe and valves was a major detriment to overhaul progress. Despite the fact that the 180-Day Letter was issued on 19 October 1973, the pipe and valves were not ordered until 4 January 1974. This aggravated an already critical supply problem.

d. S/A ATF-236K, H/I Food Service Line Modifications; and S/A ATF-237K, H/I Crew Galley Mods. The same contractor had already performed these shipalts on USS COCOPA (ATF-101) and

was proceeding with the ABNAKI installation exactly as COCOPA's when RESUPSHIP issued drawings changing several details. A great deal of confusion resulted, and some 29 change orders were issued on these two alterations.

Another major problem was the late delivery or non-delivery of special program material. Based on experience and the problems occurring simultaneously on the USS CHOWANOC (ATF-100), personnel of PERA(CSS), COMSERVGRU ONE, and ARINC Research actively monitored and expedited delivery of equipments. However, delivery dates continued to slip and some items had not been received when the overhaul was completed. Specific problems included the following:

1) Late delivery of the hot food warmers led to delays in fabrication of associated onboard components.

2) The new cold-food counter for the serving line was not delivered until late in July and lacked a dc fan motor.

3) The under counter refrigerator for the galley was also shipped minus a dc fan motor. (PERA and ARINC Research expedited these deliveries minus motors to allow the contractors to build around these important items.)

4) The deep fat fryer delivery date slipped many times and will not arrive until well after completion of overhaul.

5) The deep fat fryer firefighting system was not installed. Accomplishment of S/A ATF-255K is required to add this feature.

e. S/A ATF-213D, Replace Main Propulsion Engines and Diesel Generator Sets. Due to the unavailability of engines and generators, and uncertainty as to the optimum electrical power generating system required, the auxiliary engine portion of this shipalt was cancelled for all fiscal year 1974 overhauls of ATF class ships. As with other recent overhauls, several drawing problems were associated with the installation of the new main propulsion engines. The initial set of replacement engines for ABNAKI was diverted

for another installation, and RESUPSHIP was not so advised until after the fact. Additional engines were then ordered. The engines were not available at the start of overhaul, and initial indications were that they would be delivered three months past the required date. Completion and shipping were expedited, however, and two engines were received in mid-March and the other two at the end of the month.

f. AER ATF-84, Improve Salvage Capability. The initial drawings issued to the contractor showed the hull side-rollers in a position that made them virtually useless in salvage operations. Redesign was necessary before the installation could be completed.

g. AER ATF-85, Install Waste Heat Evaporators. The evaporators purchased for the overhaul of USS APACHE (ATF-67) were redesignated for ABNAKI when the APACHE overhaul was cancelled. However, the ship's service voltage on the decommissioned APACHE was 115 Vdc, while on ABNAKI it is 230 Vdc. Suitable (230 Vdc) motors for the evaporator's pumps were not available, so the 115 Vdc motors had to be rewound at the factory. As a result, the evaporators and their components were not received until well after the start of the ABNAKI overhaul.

h. S/A ATF-212K, General Weight and Moment Compensation. To meet the requirements of this alteration, lead ballast was installed in the oil tanks. For a while it appeared that this material might have to be replaced because of the possibility of fuel oil contamination. After reviewing the situation, NAVSEASYSCOM directed that replacement was not required, but that fuel samples be tested periodically to determine if contamination does occur.

7. Narrative of Major Repair Items

The major repair items during the ABNAKI overhaul were 1) installation of a new boiler and new laundry equipment as maintenance replacements, 2) installation of a rebuilt and upgraded tow machine, 3) overhaul of the main propulsion generators, motors, and switchboard, and 4) overhaul of the ship's service generators, engines, and switchboards. In

addition, most of the pumps, motors, controllers, deck machinery, refrigeration compressors, steering gear, and several electronic equipments were overhauled. Several of these items merit further comment, and are discussed below.

In accordance with RESUPSHIP requirements, the contractor was to submit reports of conditions found by the dates given in the work specifications. Many of these reports were received late. Several other reports, while submitted on schedule, later proved invalid. They did not identify any discrepancies, but when work actually started discrepancy reports were submitted. This was particularly true in the case of electrical equipment, for which much of the work was not started or completed as scheduled.

Impacting on the overall repair picture was the work-overload condition at the shipyard during the ABNAKI overhaul. Extension of the concurrent overhaul of the USS COCOPA by about two months compromised the ABNAKI schedule from the beginning. A manning curve submitted by the contractor showed only 32 people aboard ABNAKI for one two-week period in April as he was attempting to complete COCOPA. General progress on repair tasks was unsatisfactory; many small jobs were delayed until the aggregate represented a major backlog. Specific items having the most influence on the overhaul progress are summarized below.

a. Main Engine Mufflers. After the mufflers were removed from the ship and disassembled, they were discovered to be in worse condition than expected. The most economical route, replacement, was taken.

b. Main Propulsion Generators. The POT/I report indicated a need for a complete rewind of all four generators. The contractor experienced problems in the delivery of the required copper wire. The generators were returned to the ship very late, almost at the original overhaul completion date (30 June 1974). This was one of the schedule-controlling items.

c. Switchboards. The POT/I report indicated that the main propulsion, ship's service, and IC switchboards were so badly deteriorated that they were unsafe. Complete rebuilding, including new wiring, was authorized. However, in writing the specifications, RESUPSHIP directed use of the same type of wire as was originally used on the USS COCOPA. When COCOPA's main propulsion switchboard had to be rewired because of overheating, RESUPSHIP issued change orders to the contractor relative to the type of wire to be used in all switchboards and controllers. The contractor stated that this change was going to delay return of the boards until late June. In fact, the ship's service switchboard was not returned to the ship until mid-July. This was another major reason for the overhaul extension.

d. Gun Mount. ABNAKI's gun mount was at the Development and Training Center (DATC) being rebuilt when the ship entered the shipyard. The contractor erroneously removed the foundation. A job order was issued directing the contractor to replace it at no cost to the government.

e. Tow Machinery. The rebuilt tow machine did not arrive in the shipyard until early June, and installation was not undertaken for a further two weeks.

f. Laundry. New laundry equipment was furnished by SERVGRU ONE. Long Beach Naval Shipyard prepared the installation drawings. The original installation was unsatisfactory, since access to the dryer door was difficult. Some changes were made, but the final layout was less than optimum.

g. Dry Dock Work. Undocking was delayed several weeks, one of the major reasons being the extent of repairs needed on the stern tube bearing. Inspection revealed that the bearing was loose in the sleeve. It was necessary to build up and rebore the sleeve and remount the bearing. Approximately two weeks elapsed before the contractor was authorized to remove the tail shaft and commence repairs.

h. Electrical Cabling. Electrical cable replacement was written into the specification for each motor and controller overhauled by the shipyard. In addition, ship's force performed a major recabling effort.

Following is a list of the major repair work accomplished during the ABNAKI overhaul, grouped according to cost range:

Cost Range	Item	Estimated Cost
>$100K	Overhaul propulsion generators and motors	$121,544
>$50K-$100K	Design services	60,000
>$25K-$50K	Rewire propulsion switchboard	41,172
	Temporary services	33,034
	Replace tow machine	32,490
	Topside preservation	32,032
	Overhaul #2 and #3 aux engines	30,047
	Repair steering gear	28,083
	Repair shaft and bearings	25,058
$10K-$25K	Hab mods in WR, CO cabin, CPO qtrs	24,515
	Replace boiler	24,114
	N/W hull inspection and repairs	23,600
	Overhaul 3 W/W generators	23,506
	Overhaul 9 vent motors and controllers	23,350
	Repair rudder	20,692
	U/W hull preservation	16,548
	Repair MP air system	14,922
	Repair stern tube bearing and shaft	14,919
	Nav light repairs	14,600
	Rewire ship's service switchboard	13,480
	Replace laundry equipment	13,438
	Clean and preserve four fresh water tanks	12,817
	Preserve shaft alley	12,805
	Repair boiler flat	12,466
	Dock and undock	11,960
	Repair 10-Ton boom	11,392
	Repair sea valves	11,032

Cost Range	Item	Estimated Cost
$10K-$25K (Cont)	Repair anchor windlass	10,524
	Repair anchor windlass motor, controller and resistor bank	10,484
	Repair fire, flushing, and bilge pumps	10,042
	Total	$734,666

8. Narrative of Material Condition Prior to Overhaul

ABNAKI was in below-average material condition, even for a 30-year-old vessel due for overhaul. The main engines were obsolete and difficult to maintain. In the main propulsion and ship's service electrical systems, virtually ever piece of equipment, except the main motors, required a complete overhaul. (The main motors needed minor repair.) All of the auxiliary pumps, refrigeration compressors, steering gear, purifiers, and deck machinery required major work. Electronics equipment aboard the ship was in an above-average condition in this area, but several equipments still required overhaul.

Mission-degrading INSURV items included lack of a twinned-agent fire fighting system in the machinery spaces; poor condition of No. 2 main engine, evaporators, and power distribution cables (a major safety discrepancy); and lack of certification of the secure communications processing system to the minimum essential criteria of NAVSHIPINST 05510.33C.

Several electronics shipalts required accomplishment, including installation of a secure voice system and replacement of the AN/SPS-21 radar and the TBL-13 radio transmitter.

Finally, the ship had a seriously inadequate ac power; did not meet current habitability standards; had a great deal of combustible sheathing and carpeting; and had no pollution abatement equipments.

9. Narrative of Material Condition After Overhaul

During the overhaul, the problems mentioned above were corrected. New installations included four engines, main-propulsion air compressors, evaporators, boiler, radar set, and radio transmitter. Other

improvements included a rebuilt and modernized tow machine and other salvage-capability improvements; and a rebuilt gun mount. The ac power capacity was increased, and environmental protection capability and habitability levels were raised considerably. In the opinion of ARINC Research, ABNAKI received the most thorough of the five ATF overhauls at San Diego during fiscal year 1974, and should be able to operate until its next overhaul with a minimum of outside assistance.

Due to the age of the ship, ship's force will have to maintain a program of replacing steam-and-drain piping and bilge piping. Also, the existing cable-replacement program should be continued; extensive fire main replacement will be required during the next overhaul; the galley and food services shipalts should be completed as soon as possible; and corrective shipalts must be developed for the electrical power generating plant.

C. LONG RANGE MAINTENANCE REQUIREMENTS

An essential element of overhaul maintenance planning is assuring continuity from one overhaul to the next. An influential factor in attaining this continuity is the Long Range Maintenance Plan (LRMP). Taking the completion date of the ABNAKI overhaul as a starting point, and utilizing the records of that overhaul, PERA prepared a plan identifying long-range maintenance requirements for the ABNAKI. This plan addresses the period between overhauls, and specifies major maintenance requirements that should be targeted for accomplishment during the next overhaul.

Together with the LRMP, a second group of work (that deferred during the overhaul) was identified and the associated information was provided to the ship for inclusion in and updating of the Current Ships Maintenance Projects (CSMP). The LRMP does not discuss the work entered into the CSMP, although planning for and accomplishment of that work is an integral part of long-range maintenance planning.

Probably the most important aspect of long-range maintenance planning is ship's force scheduling and accomplishment of 3M Planned Maintenance Subsystem (PMS) requirements. If ship's force pursues this program thoroughly and conscientiously, maintenance problem areas can be identified promptly and corrected before major deficiencies develop.

The long-range maintenance requirements identified for ABNAKI are shown in Table III.C-1. Section A of that table lists work defined and deferred during the recent overhaul. Ship's force and/or the overhaul manager (COMSERVPAC/COMSERVGRU) should start now to plan and budget for its accomplishment. Section B is work recommended for accomplishment during the next overhaul that requires actions by the overhaul manager early in the requirements planning phase. Long-lead-time material must be ordered, or preoverhaul testing and inspection has to be scheduled to firm up repair requirements. Section C is work that should be given high priority for accomplishment during the next overhaul. For most of this work, preoverhaul testing should not be required. Section D identifies PMS-related actions whose accomplishment during the period between overhauls is considered especially important in preparation for the next overhaul.

No attempt has been made to include programmed ship alterations into this plan. It is considered that these are adequately handled by existing programs under the FMP.

The deferred work had no impact on the overall quality of the ABNAKI overhaul, or on the ability of the ship to perform its assigned tasks and missions.

TABLE III. C-1. DEFERRED WORK/LONG-RANGE MAINTENANCE ACTIONS, USS ABNAKI (ATF-96) (Sheet 1 of 2)

EIC	Description	Remarks	Est. Cost ($)
	A. WORK DEFINED AND DEFERRED DURING 1974 REGULAR OVERHAUL		
1601	Deck Covering	Replace terrazzo deck covering in scullery and pantry.	1,000
4100	Switchboard Splash Shields	INSURV discrepancy	3,500
4301	2.5 KW Emergency Generator	Develop a shipalt to replace with a larger, modern unit.	
AD01	Watertight Doors	Replace four doors	5,000
TD04	Sluice Valves	Repair 11 valves	8,000
TE01	Fuel Oil Tank Heating Coils	Replace in A-409-F and A-410-F	5,000
	B. REPAIRS RECOMMENDED FOR NEXT ROH REQUIRING LLTM		
T801	Fire Main Piping and Valves	Inspect, repair, replace, copper-nickel pipe.	30,000
YC04	Boat Davits	Repair or replace	
	C. OTHER LONG-RANGE MAINTENANCE REQUIREMENTS		
N40V	Degaussing	Inspect and repair	5,000
1908	Lathe	Overhaul	
LJ00	Navigation Lights	Modify navigation lights to conform with 1972 International Regulations. Shipalt is being prepared.	
T103	Condensate Return Pump	Replace	

TABLE III. C-1. (Sheet 2 of 2)

EIC	Description	Remarks	Est. Cost ($)
	D. PMS ITEMS (SHIP'S FORCE ACCOMPLISHMENT)		
1806	Salvage Equipment		
1807	Diving Equipment		
310U	Ship Service Diesel Generators		
4000	Electrical Safety Devices		
4400	Power Distribution Cabling	Continue ship's replacement program.	
C000	Main Propulsion Diesel Engines Reduction Gears, Generators, Motors		
T100	Auxiliary Boiler/Steam Piping		
T500	Refrigeration System		
TA03	Bilge Drainage Piping, Valves, and Manifold	Ship's force replace	
TF00	Compressed Air Systems		
TK00	Evaporators		
TM00	Deck Machinery Tow Machine		

D. RECOMMENDATIONS

1. For the Ship

It is recommended that ship's force personnel of the ABNAKI take the following actions:

a. Maintain an active program of replacing steam, drain, and bilge piping and power distribution cabling.

b. Ensure that the CSMP is up to date and accurately reflects the condition of the ship following overhaul. Completed action reports should be submitted for previously deferred work items accomplished during the overhaul. Work items not accomplished should be reviewed and revised as necessary to reflect their status at the end of the overhaul.

c. Follow-up on and ensure receipt of updated record plans and documents that reflect the condition of the ship at the end of overhaul.

d. Take action as necessary to accomplish deferred work/long range maintenance items, as discussed in Section III. C.

2. For the Class

It is recommended that for ATF-96 class ships, the type commander, with assistance from PERA and the ships, accomplish the following:

a. Plan for and accomplish a series of habitability studies and incorporate the results into future alteration and overhaul planning. The objective of this action is to update priority of accomplishment and obtain the necessary data to authorize early development of plans and ordering of material.

b. Review existing alterations to determine new equipment/material requirements and take action as needed to obtain these items, e.g., replacement of auxiliary ship-service generator sets and air compressors.

c. Take follow-up actions as required to resolve electrical power requirements and availability for these ships, and provide for accomplishment of any modifications during the next overhaul.

d. Analyze, as required, Board of Inspection and Survey (INSURV) reports and requests that shipalts or AERs be prepared. Several Part I INSURV discrepancies have been noted on all ships of the class. Some examples are the obsolete 2.5 kW emergency generator; lack of machinery-space access trunks, a thermopneumatic magazine sprinkler system, and a switchboard splash shield; several magazine discrepancies, etc.

3. Standardized ROH Work Requests (Form 7490.2K)

It is recommended that a program to develop standardized work requests and overhaul specifications for ATF-class ships be actively pursued. ARINC Research is currently developing a standard-work package under contract with COMSERVPAC.

4. For PERA(CSS)

It is recommended that PERA take the following actions with respect to advance overhaul planning:

a. Revise the planning milestone tasks to incorporate the most recent procedures and techniques.

b. Analyze the reports and documents required to support overhaul planning, and issue appropriate specifications for their preparation and distribution.

c. Actively pursue relationships with various SUPSHIP organizations to develop better understanding of the PERA functions and the need for interchange of advance planning data.

d. Review the need for more active participation of PERA during the overhaul management phase.

e. Increase the emphasis on advance material definition and procurement for overhauls.

f. Select and task an organization to develop and maintain alteration equivalent to repair (AER) drawings. One of the difficulties encountered in the planning process was obtaining drawings for the type commander's AERs. No activity is tasked to maintain class

drawings for these alterations. This situation leads to delays and unnecessary expenditure of design funds.

g. Increase distribution of the Fleet Integrated Logistics Support (FILS) report, for example to the Naval Material Management Field Office and Supply Operations Assistance Program teams.

E. EVALUATION/USEFULNESS

1. PERA Products to Ship/Industrial Activity

a. Ship Systems Definition and Index (SSDI). The SSDI was found useful by ship's force, supporting them in assembling a comprehensive work package.

b. Integrated Work Package (IWP) Summary Report. The IWP was utilized by the ship and the type commander as a record of screening action and as a tool in updating the CSMP.

c. POT/I Plan. The POT/I reports on deck machinery were of marginal use to the ship because of their poor quality. For future overhauls, the results expected from specific tests and inspections should be better defined. The electronics POT/I was very beneficial, as it identified not only industrial activity work items but tender/DATC and ship's force work as well.

d. Tradeoff Analysis. Results of a tradeoff analysis were provided to the overhaul manager prior to the overhaul tradeoff conference, giving him the data necessary to authorize the most effective overhaul work package.

e. FILS Report. FILS program information was not utilized by the industrial activity.

2. Resource Effectiveness

a. Ship's Force. Ship's force personnel were hindered in preparing their work package by the late scheduling of the INSURV inspection. However they did generate an adequate package.

b. RESUPSHIP. RESUPSHIP was cooperative in providing estimates and making personnel available to discuss the unwritten specifications. During the overhaul, it became apparent that their workload prevented timely response and investigation of inspection deficiency reports (IDRs) and design problems.

c. PERA(CSS). PERA(CSS) personnel screened the work package and presented it to RESUPSHIP approximately 15 days ahead of their requested date. PERA conducted several major tasks in behalf of the overhaul manager for his concurrence, including a screened work package, a POT/I plan, and a tradeoff analysis. This contribution, together with continuous liaison, permitted the overhaul manager to concentrate his efforts on the management of the overhaul.

USS CHOWANOC (ATF-100)

POST OVERHAUL ANALYSIS REPORT

Approved: _____

Date: _____

Distribution

PERA(CSS)
COMSERVPAC
COMSERVGRU ONE
USS CHOWANOC (ATF-100)

Prepared by

ARINC RESEARCH CORPORATION
Ships and Ordnance Division
Honolulu Support Office

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USS CHOWANOC (ATF-100)
POST OVERHAUL ANALYSIS REPORT

TABLE OF CONTENTS

I. GENERAL INFORMATION AND PREFACE

A. GENERAL INFORMATION

Ref: (a) Contract N66314-74-C-2052

(b) PERA(CSS) Milestone Charts, dated August 1972; forwarded by PERA(CSS) letter, Ser. 1800-262, dated 4 May 1973

B. PREFACE

USS CHOWANOC (ATF-100) was overhauled from 28 February 1974 through 11 October 1974 under the direction of the Supervisor of Shipbuilding, San Diego, CA. The overhaul was accomplished at the San Diego Marine Construction Company.

In planning the overhaul of CHOWANOC, PERA(CSS), acting as TYCOM and NAVSHIPS maintenance management agent, established advance planning milestones (references a and b) that commenced 6-1/2 months prior to the overhaul start date. The goal of the planning effort was to identify in advance any potential and existing problem areas, and to provide the detailed preoverhaul guidance, planning, and coordination necessary to achieve a successful yard overhaul. The purpose of this report is to evaluate the management judgments and decisions associated with the planning effort.

II. MANAGEMENT SUMMARY

References a and b list the management milestones in planning the FY 1974 regular overhaul of USS CHOWANOC (ATF-100). Deviations from the milestones that affected the overhaul, and unanticipated factors that contributed to the final overhaul outcome, are discussed below.

A. AUTHORIZED VS. ACCOMPLISHED WORK

CHOWANOC departed the contractor's shipyard on the declared overhaul completion date with the following significant work still pending:

a. Complete repairs to No. 3 main engine.

b. Repair bearing outer races on No. 2 main engine reduction gear.

c. Correct unsatisfactory operation of evaporators in the main engine waste heat mode.

In addition to the above items, numerous other deficiencies required attention before CHOWANOC was fully operational. The majority of these items were corrected by 8 November 1974.

B. PLANNED VS. ACTUAL COMPLETION TIME

The CHOWANOC overhaul was completed 52 days behind schedule. The delay can be attributed to a heavy workload on the San Diego waterfront, resulting in generally slow progress; late delivery of government-furnished material; the time needed to repair a damaged replacement for a main engine; several installation-drawing design problems; and a strike of local sheet metal workers.

C. PLANNED VS. ACTUAL COMPLETION COSTS

The SUPSHIP departure report had not been released as of the preparation of this report, so a comparison of actual versus estimated costs for the CHOWANOC overhaul cannot be presented herein. A supplement to this report will be prepared and forwarded after receipt of the departure report.

D. MAJOR CONFIGURATION CHANGES

The major configuration changes to CHOWANOC involved replacing the main propulsion engines and accomplishing several pollution-abatement shipalts. Habitability was significantly upgraded, a modernized towing machine was installed, and a secure voice-communication capability was added.

E. FOLLOW-ON WORK REQUIRED

In addition to completing the items noted in paragraph A above, and in the Long-Range Maintenance Plan, the development of several shipalts for modernizing the electrical power generating plant is required.

III. DETAILS OF OVERHAUL

A. PLANNING PROCESS

1. Ideal Vs. Actual Milestones

Advance overhaul planning for USS CHOWANOC commenced on 6 August 1973, the start date of the ARINC Research support contract. The planning procedures for the CHOWANOC overhaul are as defined in the COMSERVPAC "Overhaul Planning Chart, Task Index and Tasks", dated 15 September 1972; and the PERA(CSS) "Combatant Support Ship Overhaul Advance Planning Milestones". These advance planning milestones provide for accomplishment of 53 tasks, of which 36 tasks are PERA action responsibility. The ideal target dates for these tasks range from start of overhaul minus 20 months (A-20), to completion of overhaul plus 2 months (C+2).

With the CHOWANOC overhaul scheduled to start 25 February 1974, ARINC Research began advance planning at about A-6-1/2 months. This made it necessary to compress the timeframe of the planning milestones and combine some tasks; however, all required tasks were completed. Table III.A-1 shows the dates for the accomplishment of the principal milestones for CHOWANOC. The following paragraphs summarize the advance planning for the overhaul.

a. Advance Overhaul Planning. Overhaul planning was initiated by ARINC Research with a survey of the available maintenance history of CHOWANOC as contained in the Current Ships Maintenance Project (CSMP) and the Maintenance and Material Management (3M) Program Material History Report. Programmed ship alterations (shipalts) and type commander alterations were reviewed, along with other pertinent maintenance history documents such as last overhaul records, departure reports, Board of Inspection and Survey (INSURV) reports, and casualty reports (CASREPTs).

SUPSHIP/ San Diego originally requested CHOWANOC's work package from ARINC Research by 4 September 1973. Based on the contract award date, the available time (less than one month) was considered insufficient to screen the work package to meet this

TABLE III.A-1. IDEAL VS. ACTUAL MILESTONES FOR ROH OF USS CHOWANOC (ATF-100) (Sheet 1 of 2)

Milestone	COMSERVPAC Target Date	Contract Target Date	Actual Start	Completion	Remarks
PERA Contract Start Date		8/6/73	8/6/73		
Obtain Historical Data/ Review Alt Package	Immed.	8/6/73	8/6/73	9/1/73	CSMP, 3M-material history reports, shipalts, AERs, INSURV reports, CASREPTs.
Brief Ship on Overhaul Preparation	Prior to deployment	8/7/73		8/7/73	
Receive Work Package	Immed.	8/15/73	9/6/73	10/10/73	Complete work package, minus POT/I items, submitted to SUPSHIP by 12 Oct. 1973.
NAVSHIPS Issue Tentative K Alts, Task First Time Alt Drawings	A-10	4/25/73		1/30/74	*ROH scheduled to begin* 8/15/73 at that time.
Screen Work Package. Determine Known Work. Shipcheck.	A-9 to A-6	8/15/73	9/6/73	10/12/73	Complete work package, minus POT/I items, submitted to SUPSHIP by 12 Oct. 1973.
Determine POT/I Requirements	A-6	8/15/73		8/15/73	
Conduct POT/I	A-6 to A-3	10/1/73	10/1/73	10/12/73	DATC conducted deck machinery POT/I. SUPSHIP and manufacturer's tech reps did others.
NAVSHIPS Issue 180-Day Letter	A-6	8/25/73		9/7/73	Advance copy.
Conduct Work Definition Conference	A-2	12/26/73		1/8/74	

TABLE III.A-1. (Sheet 2 of 2)

Milestone	COMSERVPAC Target Date	Contract Target Date	Actual Start	Completion	Remarks
Perform Overhaul		2/25/74 to 7/21/74	2/25/74	10/11/74	
Complete Final Report	C+2	12/11/74	10/11/74	12/15/74	

date. A compromise was reached whereby the majority of the work package was to be submitted by 1 October 1973 and the remainder by 15 October 1973. The entire work package, minus electronic POT/I items, was submitted by 12 October 1973.

A POT/I restricted availability was assigned to the U.S. Navy Development and Training Center (DATC)/San Diego from 1 to 12 October 1973. SUPSHIP/San Diego conducted the electronics POT/I, and manufacturer's technical representatives inspected the towing machinery and gyro. Reports from these inspections were used to prepare the work specifications for the equipments involved.

The NAVSHIPS 180-Day Letter provided a planning estimate of $403,767 for the authorized K-alts. Due to the high inflation rate of 1973, and to the high costs experienced in accomplishing these same alterations on USS MOLALA (ATF-106), the SUPSHIP planning estimate was $492,572. Additional funds were requested from and provided by NAVSHIPS to allow the entire alteration package to be accomplished.

b. Tradeoff Conference. The overhaul tradeoff conference was originally scheduled for 26 December 1973. This date was delayed to 8 January 1974 due to the inconvenience of holding the conference during the holiday season, and because of the late completion of work-package design action. At the conference, attended by representatives of SUPSHIP/San Diego, CHOWANOC, COMSERVGRU ONE, PERA(CSS), and ARINC Research Corporation, work with a planning estimate of $1,640,000 was authorized for the TYCOM portion of overhaul. COMSERVPAC later authorized additional funds, and the final planning estimate was $1,750,000. The entire work package as authorized was included in the invitation for bid. Several significant work items were deferred at the conference due to lack of funds and are listed in the Long Range Maintenance Plan (para. III.C).

c. Overhaul Phase. The low bidder on the entire package (type commander repairs and NAVSHIPS alts) was San Diego Marine Construction Co., with a bid of $1,449,000. ARINC Research's

main planning responsibility during the overhaul was monitoring its progress and assisting in the management of COMSERVGRU resources in light of additional requirements developed during, and as a result of, the overhaul. To accomplish these objectives, ARINC Research personnel attended several weekly progress conferences and provided liaison between the COMSERVGRU ONE maintenance staff, SUPSHIP, and the ship.

After the award of the contract to San Diego Marine, one deferred job – overhaul of the battery charging switchboard – was authorized. For several electronic equipments including the AN/WRT-1, overhaul work requests deferred at the conference and originally screened to DATC were subsequently accomplished by NAVELEX/ San Diego utilizing overhaul funds.

d. Postoverhaul Phase. ARINC Research's responsibility following completion of the overhaul was to analyze the overhaul records and prepare a final report.

2. Impact of Planning Milestone Slippages

The initial K-alt authorization message was issued more than a year in advance of the start of overhaul. No first-time alts were authorized. In spite of these favorable circumstances, supplementary alteration drawings were completed behind schedule and represented a primary reason for delay of the tradeoff conference.

3. Recommendations

As a result of the review of the planning process for the CHOWANOC overhaul, ARINC Research recommends that PERA(CSS) direct efforts toward:

a. Reviewing the target dates for advance planning milestones; establishing feasible dates, based on experience; and encouraging adherence to these dates.

b. Early submittal to SUPSHIP of the ship's work package so as to permit development of accurate estimates and specifications to support a work definition conference.

c. Reconsideration of the requirement to include final cost data in postoverhaul reports. Under present conditions the data are not available by the milestone date (C+2).

d. Early definition and firming up of the ship alteration package and the authorization to develop required drawings.

e. Increased PERA participation in the overhaul management phase.

B. WORK PACKAGE

1. Summary Sheet
2. Cost Summary Sheet
3. Alteration Summary Sheet
4. TYCOM Repair Package
5. PERA Screening Summary
6. Narrative of Major Alteration Items
7. Narrative of Major Repair Items
8. Narrative of Material Condition Prior to Overhaul
9. Narrative of Material Condition After Overhaul

1. Summary Sheet – USS CHOWANOC (ATF-100)

Scheduled Start Date: 25 Feb 74 Scheduled Completion Date: 21 Jul 74

Actual Start Date: 25 Feb 74 Actual Completion Date: 11 Oct 74

Overhaul Extended:* 52 days

*Overhaul extended due to general lack of progress during the overhaul; SUPSHIP and contractor overloads; late delivery of GFM; design problems; a damaged new main engine; and a strike of sheet metal workers.

SIGNIFICANT CAPABILITY CHANGES:

a. CHOWANOC received four new Caterpillar D-399 main propulsion engines. In a companion alteration, waste heat evaporators replaced the existing solo-shell evaporators.

b. A rebuilt and modernized AA Johnson Series 222 tow machine was installed. Salvage capability was improved and the 10-ton boom strengthened.

c. An AFFF/PKP fire fighting system was installed in the machinery spaces.

d. Several pollution abatement shipalts were accomplished, including a CHT system, installation of tank level indicators, a bilge flooding alarm circuit, and a bilge water discharge riser.

e. Several habitability shipalts (both title D and K) were accomplished, including galley, food service, and mess deck modernization. All sanitary spaces were refurbished. A modernized laundry was installed.

f. A secure voice-communication system was installed.

2. Cost Summary Sheet – USS CHOWANOC (ATF-100)

a. Summary of Overhaul Costs	K-Alt	Repair
1) Budget	$492,572	$1,750,000
2) Industrial Activity Estimate	420,036	1,465,394
3) Design and GFM	72,536*	283,964*
4) Total Estimate	492,572	1,749,358*
5) Bid Price	332,161	1,116,839
6) Bid Price and Design and GFM	404,697	1,400,803
7) Total Cost	Not Available	
8) Growth Cost	Not Available	
9) Percent Growth	Not Available	

*As presented in SUPSHIP/San Diego prearrival conference report.

b. Estimated Overhaul Costs by EIC Category. Estimated overhaul costs by EIC category are listed in Table III. B-1.

c. Cost Avoidance Summary. For the CHOWANOC overhaul, 522 work requests were received from the ship and screened by PERA. Of this total:

1) 32% (167) were screened as deferred, duplicated, disapproved, etc., as a result of shipchecks, discussions with ship personnel, and analysis of the work requested.

2) 9.2% (48) were disapproved, most of which were for alteration type work.

This reduction of the work package represented a substantial cost avoidance to the type commander, as well as a considerably lightened work load for the overhauling activity and overhaul manager.

During the screening process, a large number of work requests were designated for accomplishment by ship's force or IMAs. This allowed funds to be available for the jobs that a shipyard can best accomplish.

Job specifications were reviewed as they were being written at SUPSHIP/San Diego. A considerable number (about 35%) were

returned for rewriting to clarify the intent of the work request, to correct errors, to expand coverage, etc. This effort reduced substantially the number of change orders issued on repair jobs.

3. Alteration Summary Sheet

The alteration summary sheet is presented in Table III. B-2.

TABLE III. B-1. ESTIMATED COSTS BY EIC CATEGORY FOR ROH OF CHOWANOC (ATF-100) (Sheet 1 of 3)

EIC		Est. Cost ($)		Pct. Total Cost		Pct. Growth	
System	Subsys.	System	Subsys.	System	Subsys.	System	Subsys.
A000		60,759		3.6			
	AB00		15,716		0.93		
	A000		10,881		0.64		
	A100		18,899		1.12		
	A500		1,050		0.06		
	A700		2,862		0.17		
	A900		11,351		0.67		
C000		447,644		26.5			
	CC00		24,547		1.46		
	CD00		16,609		0.98		
	CE00		86,359		5.12		
	C100		260,418		15.44		
	C400		29,021		1.72		
	C600		7,498		0.44		
	C700		9,462		0.56		
	C800		10,284		0.61		
	C900		3,446		0.20		
L000		19,967		1.2			
	LB00		12,198		0.72		
	LJ00		7,769		0.46		
M000		78,975		4.7			
	M500		11,643		0.69		
	M600		67,332		3.99		
P000		9,752		0.6			
	P100		5,028		0.30		
	P600		4,724		0.28		
Q000		24,728		1.5			
	QD00		2,618		0.16		
	QF00		11,698		0.69		

TABLE III. B-1. (Sheet 2 of 3)

EIC		Est. Cost ($)		Pct. Total Cost		Pct. Growth	
System	Subsys.	System	Subsys.	System	Subsys.	System	Subsys.
	Q100		7,822		0.46		
	Q300		2,590		0.15		
R000		2,487		0.2			
	R500		2,487		0.15		
T000		498,806		29.6			
	TA00		12,671		0.75		
	TB00		15,148		0.90		
	TF00		18,951		1.12		
	TK00		95,077		5.64		
	TL00		22,502		1.33		
	TM00		66,080		3.92		
	TS00		15,481		0.92		
	T100		30,337		1.80		
	T300		33,506		1.99		
	T500		17,095		1.01		
	T700		91,484		5.42		
	T800		32,352		1.92		
	T900		48,122		2.85		
U000		150,474		8.9			
	UD00		18,000		1.07		
	UE00		16,640		0.99		
	UF00		30,042		1.78		
	UG00		2,500		0.15		
	UH00		5,000		0.30		
	UJ00		19,613		1.16		
	U500		1.771		0.10		
	U600		23,009		1.36		
	U700		28,899		1.71		
	U800		5,000		0.30		

TABLE III. B-1. (Sheet 3 of 3)

EIC		Est. Cost ($)		Pct. Total Cost		Pct. Growth	
System	Subsys.	System	Subsys.	System	Subsys.	System	Subsys.
1000		254,459		15.1			
	1A00		6,201		0.37		
	1B00		139,151		8.25		
	1C00		53,891		3.19		
	1100		52,584		3.12		
	1600		2,632		0.16		
3000		80,500		4.8			
	3100		80,500		4.77		
4000		58,530		3.5			
	4100		24,154		1.43		
	4700		34,376		2.04		

TOTAL: $1,687,081

(NOTE: The difference between above total and that given in para. 2.a (page 12) is due to the refinement of estimates after the tradeoff conference and deletion of contingency estimates.)

TABLE III. B-2. ALTERATION SUMMARY SHEET – USS CHOWANOC (ATF-100) (Sheet 1 of 2)

Alteration		FMP Est. ($)	NAVSHIP Est. ($)	SUPSHIP Est. ($)	Actual Cost ($)	Remarks
ATF-205K	Install VHF/UHF Secure Voice (Partial to Complete)	15,805	13,104	14,406		Complete
ATF-212K	General Weight and Moment Compensation	11,554	9,828	25,258		Complete
ATF-216K	Install Machinery Space AFFF/PKP Firefighting System	87,100	71,253	60,097		Complete
ATF-226K	P/A Sewage CHT	150,093	122,850	92,988		
ATF-227K	P/A Install Bilge Water Discharge Riser	10,573	9,009	15,559		Complete
ATF-229K	P/A Install Fuel Tank Level Indicating Sys.	78,698	64,701	83,209		Partial. Minor mods required.
ATF-232K	Bilge Flooding Alarm Circuit FD	2,071	1,638	13,784		Complete
ATF-236K	H/I Food Service	21,037	17,199	37,869		Partial. All GFM not received.
ATF-237K	H/I Galley Mods	46,979	38,493	98,347		Partial. All GFM not received.
ATF-243K	H/I Sanitary Spaces Vent and Sheath	54,282	44,226	36,577		Complete
ATF-244K	H/I Relocate Hot Water Heater	14,061	11,466	14,278		Complete
ATF-165D	Modify Boiler Air Casing					Complete. Estimate included in boiler replacement job.
ATF-182D	Reinforce Ten Ton Boom			3,097		Complete

TABLE III. B-2. (Sheet 2 of 2)

	Alteration	FMP Est. ($)	NAVSHIP Est. ($)	SUPSHIP Est. ($)	Actual Cost ($)	Remarks
ATF-213D	Replace Main and Auxiliary Engines			260,418		Partial. Main engines replaced. Auxiliary engines to be subject of revised shipalt.
ATF-256D	H/I Crews Mess Mods			31,190		Complete
AER ATF-75	Install Cut Out Valve in Boiler Fuel Supply Line					Complete. Estimate included in boiler replacement job.
AER ATF-84	Improve Salvage Capability			52,584		Complete
AER ATF-85	Install Waste Heat Evaporators			87,077		Complete
AER ATF-89	Install Remote Start/ Stop Stations for Fire Pumps			1,972		Complete
AER ATF-102	Crews Clothing Lockers			3,900		Partial. Lockers ordered for ship's force installation.

4. TYCOM Repair Package – USS CHOWANOC (ATF-100)

		No.	Pct.
1.	Total Automated Work Requests	0	
2.	Total Work Requests Screened	522	
	a. Number of Work Requests Deferred	39	7.5
	b. Number of Work Requests Disapproved	48	9.2
	c. Number of Work Requests Duplicated, etc.	80	15.3
	d. Number of Work Requests Approved	355	68.0
	TOTAL	522	100.0
3.	Total Work Requests Approved	355	
	a. Number Work Requests Screened: Priority One (1)	11	3.1
	b. Number Work Requests Screened: Priority Two (2)	144	40.6
	c. Number Work Requests Screened: Priority Three (3)	187	52.7
	d. Number Work Requests Screened: Priority Four (4)	13	3.6
	e. Number Work Requests Screened: Priority Five (5)	0	0.0
	f. Number Work Requests Screened: Priority Six (6)	0	0.0
	TOTAL	355	100.0
4.	Number of Approved Work Requests by Type Work	355	
	a. Repair (including Remove, Replace, Manufacture, Drydock, POT/I, and Calibrate)	333	93.8
	b. Ship Alteration	3	0.9
	c. TYCOM AER	9	2.5
	d. Habitability	5	1.4
	e. Routines	5	1.4
	TOTAL	355	100.0
5.	Number of Approved Work Requests Insurance Items: As insurance items were identified, the ship was advised to include them in the work package. Separate identity was not maintained.	NA	NA
6.	Number of Approved Work Requests Accomplished	NA	NA
7.	Number of Approved Work Requests Not Accomplished and Not Entered in CSMP	NA	NA

5. PERA Screening Summary – USS CHOWANOC (ATF-100)

1. Screening Action*	PERA	TYCOM
a. Number of Work Requests Screened One (1)	127	See Comments
b. Number of Work Requests Screened Two (2)	75	
c. Number of Work Requests Screened Three (3)	153	
d. Number of Work Requests Screened Four (4)	0	
e. Number of Work Requests Screened Five (5)	0	
f. Number of Work Requests Screened Six (6)	0	
g. Number of Work Requests Screened Seven (7)	0	
h. Number of Work Requests Screened Eight (8)	39	
i. Number of Work Requests Screened Nine (9)	48	
j. Number of Work Requests Screened Zero (0)	80	

2. Total Number Work Requests TYCOM Concurred: See Comments

3. Total Number Work Requests TYCOM Screened Otherwise: See Comments

4. See Comments % Agreement in Screening

5. Analysis of Screening Differences: See Comments

6. Comments/Recommendations:

Screening actions were reviewed with the overhaul manager prior to being finalized. No distinction was made between PERA and TYCOM screening actions. It can be generally stated that the overhaul manager concurred with the recommended screening.

*LEGEND: Screening Action (Appendix 17, OPNAV 43P2)

1. Shipyard accomplish
2. Tender or repair ship accomplish
3. Ship's force – (tender or repair ship/yard) assist
4. Accomplish as alteration equivalent to a repair
5. Ship to shop
6. Accomplish with modification
7. Yard open inspect – advise TYCOM – proceed with minimum repairs
8. Deferred
9. Disapproved
0. Other – specify in remarks

6. Narrative of Major Alteration Items

Despite the fact that no first-time shipalts were accomplished on CHOWANOC, major design and GFM problems were encountered. The strike of sheet metal workers delayed completion of the habitability shipalts. These and other problems with specific shipalts are discussed below.

a. S/A ATF-212K, General Weight and Moment Compensation. This shipalt provides for the installation of ballast to compensate for changes in weight and moment resulting from work accomplished during the overhaul. Because of drydock weight limitations, the ballast was not installed until after undocking. When the ballast work was undertaken, it was found that the installation drawings were not specific as to ballast location and stacking method. The contractor requested SUSPHIPS assistance in correcting the drawings. The ballast was then installed, but a further problem became evident: the ballast in one of the fuel tanks was found to be covered with cement and improperly stowed. That ballast had to be removed, cleaned, and restowed. As a result of these problems, the installation of the No. 3 main engine was delayed, and the No. 1 main engine had to be realigned. This overall situation contributed significantly to the delay in completing the overhaul.

b. S/A ATF-216K, AFFF/PKP Firefighting System. Despite the fact that this alteration had been accomplished on several other ATF-type ships, several design-drawing problems became evident during the installation. Operating stations were not properly located on the drawings, and the drawings had to be changed. GFM was not received in time to support an orderly installation schedule. This late receipt of material, and change orders resulting from design modifications, were among the factors causing extension of overhaul.

c. S/A ATF-226, P/A Sewage CHT. Installation of the pollution abatement (P/A) sewage collecting and holding tank (CHT) was delayed by installation-drawing errors and late delivery of the pumps and

copper-nickel (CUNI) piping and valves. Pumps were not received until early June 1974.

d. S/A ATF-229K, P/A Tank Level Indicators. The receivers for indicating tank levels were received too late to permit their calibration when the ship was ballasted for undocking. Further, installation-drawing problems were encountered, requiring design assistance from SUPSHIP.

e. S/A ATF-236K, H/I Food Service Line; and ATF-237K, H/I Galley Mods. Several design problems were encountered during these habitability-improvement (H/I) shipalts, and several job-change orders were required. Late delivery or nondelivery of special program material seriously imparied the progress of the installation. Attempts had been made to preclude these delivery problems. Based on past experience, PERA(CSS) and SUPSHIP/San Diego attempted to establish firm delivery dates early in the planning period, but with negligible results. On 12 February 1974, SPCC stated that the scheduled delivery dates for many items were unsatisfactory. Continuous pressure was applied to improve delivery dates by all concerned activities. However, several equipments that originally had acceptable delivery dates ended up being delayed. In some instances, "partial" deliveries were arranged. The cold food counter for the serving line was not delivered until late July, and lacked a dc fan motor. The under-counter reefer for the galley was also shipped minus a dc fan motor. PERA and SUPSHIP expedited these deliveries minus motors to allow the contractor to build around these important items.

The deep fat fryer delivery date slipped many times, and that item will not arrive until well after overhaul completion. The deep fat fryer firefighting system was not installed; accomplishment of S/A ATF-255K will add this feature.

A final factor impacting on the completion schedule for the habitability improvement items was a four-week strike of sheet metal

workers in the San Diego area, which was felt particularly in the H/I area.

f. S/A ATF-213D, Replace Main and Auxiliary Engines. The auxiliary engine portion of this shipalt was cancelled for all FY 74 ATF overhauls due to nonavailability of engines and generators and uncertainty about the optimum installation (a matter presently under investigation).

For the main propulsion engines, several design problems occurred that delayed installation. Even more significant was a chain of occurrences relating to one of the new main propulsion engines, which developed as follows:

1) A new main propulsion engine scheduled for replacement on USS QUAPAW (ATF-110) was damaged en route to Pearl Harbor Naval Shipyard, where QUAPAW was undergoing its overhaul.

2) The decision was made to divert one of CHOWANOC's new engines to QUAPAW; repair at SUPSHIP 14 the engine intended for QUAPAW; and forward that engine to San Diego for installation on CHOWANOC.

3) When the engine arrived in San Diego, an inspection revealed that several of its components were either damaged or missing. Further delays were encountered in determining whether the engine had been tested (yes); what its guarantee status was (void); and obtaining the authorization and then the replacement parts needed for the repairs.

4) Repairs were completed and the engine installed in CHOWANOC. Initial testing, however, indicated further problems. The engine was disassembled and the following additional work was identified:

- Replace pistons, liners, main bearings, and injectors
- Open and inspect lube oil pump, turbo chargers, and gear train drives

- Inspect connecting rods, valve lifters, and pushrods
- Hydrostatically test the heads.

The overhaul manager and SUPSHIP agreed to proceed with dock and sea trials and complete the overhaul availability period with three main engines, and then finish the repairs to the No. 3 main engine after the overhaul.

g. AER ATF-84, Improve Salvage Capability. Initial drawings issued to the contractor showed the side rollers in a position that would make them virtually useless in salvage operations. The drawings had to be corrected before the side rollers could be installed.

h. AER ATF-85, Install Waste Heat Evaporators. For waste heat evaporators installed in Navy ships, experience has shown that a supplementary chemical treatment system (Hagevap or similar) is required. The complete system was authorized for CHOWANOC, and funds obligated at the tradeoff conference. However, the job remained in SUPSHIP Design and Planning for more than two months after the overhaul start before being issued to the contractor. Several drawing-design problems were subsequently encountered in the evaporator installation.

7. Narrative of Major Repair Items

The major repair work items accomplished during CHOWANOC's overhaul were the installation of a rebuilt boiler and new laundry equipment as maintenance replacements; installation of a rebuilt and updated tow machine; and overhaul of the main propulsion generators, motors, and switchboard. In addition, most of the pumps, motors, controllers, deck machinery, refrigeration compressors, steering gear, and several electronic equipments were overhauled. Several of these items are commented on below.

a. Schedule of Events. SUPSHIP/San Diego, in an attempt to improve overhaul management, has implemented a computerized management tool, designated PCS 3601. That tool was demonstrated during the CHOWANOC overhaul to be potentially useful, but its actual value in the overhaul was limited by the contractor's unfamiliarity with the program; and by the occurrence during the overhaul of a number of unprogrammable factors (e.g., sheet metal strike, extensive drawing errors). By compiling "negative float" on several jobs, the PCS 3601 program did highlight several problem areas, but apparently little could be done to resolve these problems.

b. Boiler Replacement. SUPSHIP/San Diego requisitioned a replacement boiler for CHOWANOC on 19 July 1973. ATF boilers are mandatory turn-in items, and there was supposedly a rebuild program under SPCC cognizance. It was found, however, that there was no new or rebuilt boilers in the SPCC supply system. On 10 September 1973, PERA requested SPCC to provide boilers for the overhauls of CHOWANOC, APACHE (ATF-67), and ABNAKI (ATF-96). In addition, PERA considered its own rebuild program, but determined that available used boilers were beyond economical repair. Through the SPCC system, PERA did locate an unused boiler at NSC/Oakland and designated it for ABNAKI. PERA also initiated action for a spot buy of a rebuilt boiler for APACHE. However, despite several messages from PERA and SUPSHIP/San Diego to SPCC over several months, no boiler was ever purchased for CHOWANOC.

When the overhaul of APACHE was cancelled, its rebuilt boiler was diverted to CHOWANOC. This boiler did not arrive until well into the overhaul, and severely disrupted the contractor's production schedule. In addition, the existing boiler on CHOWANOC was aligned 180 degrees from the boilers on the remainder of the ATF-96 class. The replacement boiler came with many automatic controls that were not on the existing boiler, and as a result would not fit the old location. The installation had to be rotated 180 degrees with the concomitant foundation, piping, and smoke pipe modifications. Design support in correcting the installation was slow in forthcoming.

c. Tow Machinery. The new tow machine did not arrive until early May, but this had minimal impact on the overhaul completion date.

d. Drydocking. The undocking portion of the CHOWANOC drydock phase was delayed considerably, primarily due to slow accomplishment of the scheduled work. This had a major impact on the overhaul completion date.

e. Refrigeration System. Extensive repairs to the refrigeration system were authorized at the tradeoff conference. Receipt of several inspection deficiency reports (IDRs) from the contractor led to a design investigation by SUPSHIP/San Diego. Some of the recommendations resulting from this investigation were incorporated during the overhaul; however, further modifications may be required in the future.

f. Metal Worker Strike. A four-week strike of sheet metal workers in July 1974 delayed completion of habitability modifications, ventilation repairs, and reefer repairs.

Following is a list of the major repair work accomplished during the CHOWANOC overhaul, grouped according to cost range.

Cost Range	Item	Estimated Cost
>$100K	None	
>$50K-$100K	Repair main propulsion generators and switchboard	$ 86,359
	Overhaul three ship's service generators and engines	80,163
>$25K-$50K	Replace boiler	30,337
	Temporary services	28,899
	Overhaul 10 vent motors and 22 controllers	27,914
$10K-$25K	Repair main propulsion motor	24,547
	Hab mods in CPO qtrs, CO stateroom, and other SRs	20,127
	Docking	19,613
	Underwater hull preservation	18,899
	Replace tow machine	18,880
	Repair thrust bearing, spring bearings, and shaft	18,798
	PCS 360 schedule	18,000
	Preserve shaft alley	17,172
	Repair steering gear	16,923
	Repair two 30-kW MG sets	16,761
	Replace propulsion generator cabling	16,608
	Replace sanitary drain piping	16,448
	Repair sea valves	15,718
	Repair sea plane winch	14,400
	Repair two fire flushing and bilge pumps	12,591
	Repair 10-ton boom and rigging	12,384
	Repair gyro system	12,198
	Repair ship's service switchboard	11,767
	Clean and preserve four fresh water tanks	11,351
	Replace flushing system piping	11,158
	Repair two 10-kW MG sets	10,848
	Repair anchor windlass	10,682
	Repair stern tube bearing and propeller	10,223
	Total	$609,768
	(34.8% of TYCOM ROH budget)	

8. Narrative of Material Condition Prior to Overhaul

Prior to overhaul, CHOWANOC required significant work on several systems and equipments. The main propulsion engines were obsolete and difficult to maintain; their replacement was definitely warranted. The ship's service generators and engines, main propulsion generators, and all switchboards were in need of overhaul. Most of the auxiliary pumps, reefers, steering gear, purifiers, and deck machinery required major work. Review of the electronics POT/I report indicated several equipments in need of repair.

Mission-degrading INSURV items included lack of secure voice communication ability and the condition of the main propulsion engines.

CHOWANOC had no pollution abatement shipalts completed; did not meet current habitability standards; had a great deal of combustible sheathing and carpeting aboard; and did not have the twinned agent firefighting system in the machinery spaces.

9. Narrative of Material Condition After Overhaul

During the overhaul, the problems mentioned above were corrected. Installed were:

a. Four new engines, new MP air compressors, new evaporators, and a rebuilt boiler.

b. A rebuilt and modernized tow machine.

c. A rebuilt gun mount.

Environmental-protection and salvage capabilities were considerably enhanced, and habitability levels were raised significantly. CHOWANOC received a thorough overhaul and should be able to operate until her next overhaul with a minimum of outside assistance.

Due to the age of the CHOWANOC, ship's force will have to maintain a a program of replacing steam and drain piping, and in particular the power distribution cabling. Some of the items in the Long Range Maintenance Plan should be accomplished prior to the next overhaul. Extensive fire main replacement will be required during the next

overhaul. The electric generating plant needs to be evaluated and the necessary shipalts developed to upgrade that system.

C. LONG RANGE MAINTENANCE REQUIREMENTS

An essential element of overhaul maintenance planning is assuring continuity from one overhaul to the next. An influential factor in this continuity is the Long Range Maintenance Plan. Using the completion date of the CHOWANOC overhaul just concluded as a starting point, together with the records of that overhaul, PERA prepared a plan identifying long range maintenance requirements. This plan addresses the period between overhauls, and specifies major maintenance requirements that should be targeted for accomplishment during the next overhaul.

Together with the Long Range Maintenance Plan, a second group of work, that deferred during the overhaul, was identified and provided to the ship for inclusion in and updating of the CSMP. The LRMP does not discuss this work, although planning for and accomplishment is an integral part of long range maintenance planning.

Probably the most important part of long-range maintenance planning is the ship's force scheduling and accomplishment of 3M Planned Maintenance Subsystem (PMS) requirements. If ship's force pursues this program thoroughly and conscientiously, maintenance problem areas can be identified promptly and corrected before major deficiencies develop.

The long-range maintenance requirements identified for CHOWANOC are shown in Table III. C-1. Section A of that table lists work defined during the recent overhaul, and ship's force and/or the overhaul manager (COMSERVPAC/COMSERVGRU) should start now to plan and budget for its accomplishment. Section B is work recommended for accomplishment during the next overhaul that requires actions by the overhaul manager early in the requirements planning phase. Long-lead-time material must be ordered, or preoverhaul testing and inspection has to be scheduled to firm up repair requirements. Section C is work that should be given high priority for accomplishment during the next overhaul. For most of this work, preoverhaul testing should not be required. Section D identifies PMS-related actions whose accomplishment during the period between overhauls is considered especially important in preparation for the next overhaul.

No attempt has been made to include programmed ship alterations into this plan. It is considered that these are adequately handled by existing programs under the Fleet Modernization Program.

TABLE III.C-1. DEFERRED WORK/LONG-RANGE MAINTENANCE ACTIONS, USS CHOWANOC (ATF-100) (Sheet 1 of 3)

EIC	Description	Remarks	Est. Cost ($)
	A. WORK DEFINED AND DEFERRED DURING 1974 REGULAR OVERHAUL		
4100	Switchboard Splash Shields	INSURV discrepancy	3,500
4301	2.5 kW Emergency Generator	Develop a shipalt to replace with a larger, modern unit.	
A703	Salvage Pump Foundations	Replace two	3,000
TD04	Sluice Valves/Operating Gear	Repair	8,000
TD05	Fuel Oil Transfer Pump, Motor and Controller	Overhaul	9,000
TE01	Fuel Oil Tank Heating Coil	Repair coils in A-409-F and A-410-F	3,000
TM06	Capstan, Motor, Controller and Resistor Bank	Overhaul	30,000
T801	Salvage Pumps, Motors and Controllers	Overhaul two	21,000
	B. REPAIRS RECOMMENDED FOR NEXT REGULAR OVERHAUL REQUIRING LLTM		
T801	Fire Main Piping and Valves	Inspect, repair, replace. Copper nickel pipe (LLTM) required.	30,000
YC04	Boat Davits	Repair or replace.	

TABLE III.C-1. (Sheet 2 of 3)

EIC	Description	Remarks	Est. Cost ($)
	C. OTHER LONG-RANGE MAINTENANCE REQUIREMENTS		
N40V	Degaussing	Inspect and repair	2,000
T503	Refrigeration Plant	Inspect and modify	15,000
1908	Lathe	Overhaul	
310W	S/S Generator Diesel Engine Mufflers	Inspect, repair (3)	7,500
LJ00	Navigation Lights	Modify navigation lights to conform with 1972 International Regulations. Shipalt being prepared. Present dual task light array is unsatisfactory.	
	D. PMS ITEMS (SHIP'S FORCE ACCOMPLISH)		
1806	Salvage Equipment		
1807	Diving Equipment		
310U	Ship Service Diesel Generator		
4000	Electrical Safety Devices		
4400	Power Distribution Cabling	A program to replace power cable should be initiated.	
C000	Main Propulsion Diesel Engines, Reduction Gears, Main Prop. Gears, Main Prop. Motors		
T100	Aux. Boiler/Steam Piping	S/F replace pipe.	

TABLE III.C-1. (Sheet 3 of 3)

EIC	Description	Remarks	Est. Cost ($)
	D. PMS ITEMS (SHIP'S FORCE ACCOMPLISH) (Cont)		
T500	Refrigeration System		
TA03	Bilge Drainage Piping, Valves and Manifold	S/F replace.	
TF00	Compressed Air System		
TK00	Evaporators		
TM00	Deck Machinery Tow Machine		

D. RECOMMENDATIONS

1. For the Ship

It is recommended that ship's force personnel of CHOWANOC take the following actions:

a. Maintain an active program of replacing steam and drain piping and power distribution cabling.

b. Ensure that the CSMP is up to date and accurately reflects the condition of the ship following overhaul. Completed action reports should be submitted for previously deferred work items accomplished during the overhaul. Work items not accomplished should be reviewed and revised as necessary to reflect their status at the end of the overhaul.

c. Follow-up on and ensure receipt of updated record plans and documents that reflect the condition of the ship at the end of the overhaul.

d. Take action as necessary to accomplish deferred work/long range maintenance items, as discussed in Section III. C.

2. For the Class

It is recommended that for ATF-96 class ships, the type commander, with assistance from PERA and the ships, accomplish the following:

a. Plan for and accomplish a series of habitability studies and incorporate the results into future alteration and overhaul planning. The objective of this action is to update priority of accomplishment and obtain the necessary data to authorize early development of plans and ordering of material.

b. Review existing alterations to determine new equipment/material requirements and take action as needed to obtain these items, e.g., replacement of auxiliary ship-service generator sets and air compressors.

c. Take follow-up actions as required to resolve electrical power requirements and availability for these ships, and provide for

accomplishment of any modifications during the next overhaul. (Note: The ship's service generator on CHOWANOC is rated at 300 kW and the switchboard circuit breaker at 200 kW.) This review should include consideration of the need for a third 30 kW MG set and the modification of the ac distribution system to balance the load among the MG sets and standarize the class.

d. Analyze, as required, INSURV reports and requests that shipalts or AERs be prepared. Several Part I INSURV discrepancies have been noted on all ships of the class. Some examples are the obsolete 2.5 kW emergency generator; lack of machinery-space access trunks, a thermopneumatic magazine sprinkler system, and a switchboard splash shield; several magazine discrepancies, etc.

3. Standardized ROH Work Requests (Form 4790.2K)

It is recommended that the existing program to utilize standardized work requests and overhaul specifications for ATF class ships be actively implemented.

4. For PERA(CSS)

It is recommended that PERA take the following actions with respect to advance overhaul planning:

a. Revise the planning milestone tasks to incorporate the most recent procedures and techniques.

b. Actively pursue relationships with various SUPSHIP organizations to develop better understanding of the PERA functions and the need for interchange of advance planning data.

c. Review the need for more active participation of PERA during the overhaul management phase.

d. Continue to monitor availability of special program material and take action to cancel shipalts if overhaul cannot be supported.

e. Increase the emphasis on advance material definition and procurement for overhauls.

f. Increase distribution of the Fleet Integrated Logistics Support (FILS) report, for example to the Naval Material Management Field Office and Supply Operations Assistance Program teams.

E. EVALUATION/USEFULNESS

The following comments are offered in evaluation of the planning and management of USS CHOWANOC's overhaul.

1. PERA Products to Ship/Industrial Activity

a. Integrated Wo_k Package Summary Reports. Computerized work package summary reports were issued periodically throughout the overhaul planning phase. These reports were used by the ship, overhaul manager, and ARINC Research to progress the development of the overhaul package. The ability to produce these reports in various sequences, such as work center-job sequence number (WCJSN), EIC category, type commander screening action, and industrial activity item number proved to be a valuable aid in managing the overhaul work package. These reports also served as an expedient method of keeping ship's force advised as to the screening action for their work requests.

b. POT/I Plan. As the work package was developed, the requirements for preoverhaul testing and inspection were identified and a plan provided to the overhaul manager. For future overhauls, the results expected from POT/Is should be better defined and a period for their accomplishment scheduled early enough for the results to be available for the tradeoff conference.

c. FILS Report. The FILS program has the potential for being a useful overhaul planning and management tool. However, there is no evidence that the industrial activities are using it to its full potential. There were no identified logistics software deficiencies at the end of the CHOWANOC overhaul.

2. Resource Effectiveness

Management of CHOWANOC's overhaul presented no specific problems. It is ARINC Research's opinion that the CHOWANOC overhaul, like previous ATF overhauls, supports the contention that a PERA representative should actively participate in the overhaul management phase at the

location of the overhaul. Such a representative would be in a position to make impartial recommendations as to new work and effective utilization of available resources.